



The SPoRT Center – Infusing NASA Technology Into NWS WFOs

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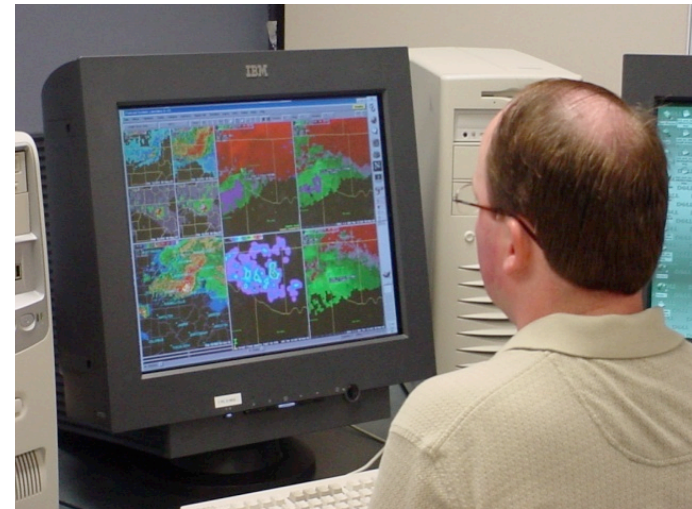
Mission of the SPoRT Center: Apply NASA measurement systems and unique Earth science research to improve the accuracy of short-term (0-24 hr) weather prediction at the regional and local scale

SPoRT website

<http://weather.msfc.nasa.gov/sport>

Collaborative Partner Blog

<http://www.nsstc.uah.edu/sportblog/>



SPoRT – Short-term Prediction and Research Transition



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SPoRT – A NASA Test Bed and More!

SPoRT is an end-to-end research to operations activity!

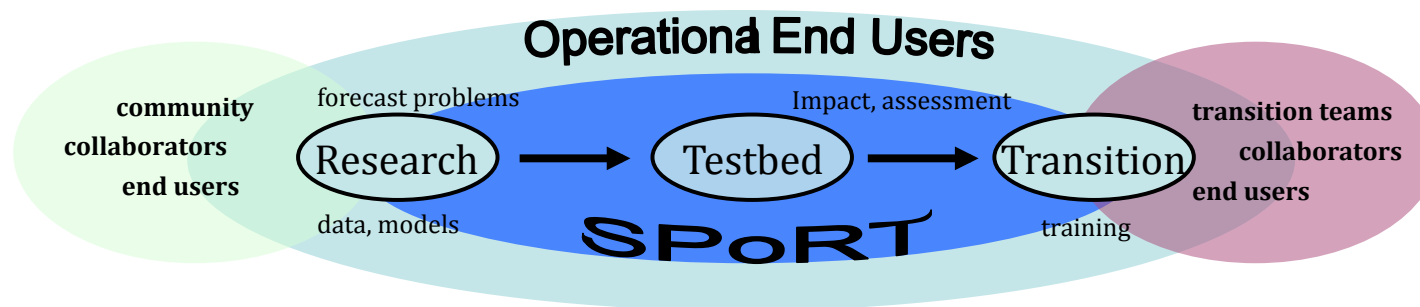
- explore cutting edge research relevant to operational weather forecasting
- work with end users to match forecast problems to capabilities / data

Demonstrate feasibility of new data / capability to address forecast problem in a simulated operational environment – this is a test bed function

- real-time data and products – timely dissemination capability
- display in operational system – visualization, interoperability with other products
- assessment and impact on forecast problem
- end user involvement critical to success

Transition of experimental data to operational environment

- mechanics of transition – AWIPS / AWIPS2 and other DSS
- training and product impact and assessment – end user involvement



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- Suite of over 30 products integrated into AWIPS
- MODIS, AMSR-E, special GOES products, and total lightning data
- WRF forecasts (from HWT)
- LIS and local surface analyses
- High resolution SST analyses for WRF EMS users

- Requested by SSD chiefs – March 2010
- Project-based expansion with existing product suite
- New regional forecast problems



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Forecast Problems / Test Bed Collaborations

Southern Region Forecast Problems

- timing and location of severe weather
- morning minimum temperatures (local variations)
- detection and monitoring of fog, smoke, fires
- coastal weather processes (sea breeze convection / temperatures)
- development / movement of off-shore precipitation processes – tropical systems
- gap filler in data void regions – atmospheric rivers of moisture



NOAA Test Bed Collaboration

- HWT – forecast program
 - NASA SST data and configurations of NSSL WRF forecasts – forecasts to WFOs
 - Lightning forecasts (derived from microphysics in WRF forecasts)
- GOES-R Proving Ground
 - total lightning data for multiple ground based networks
 - pseudo GLM product for forecaster evaluation



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MODIS Applications

Relevance to NWS Forecasters

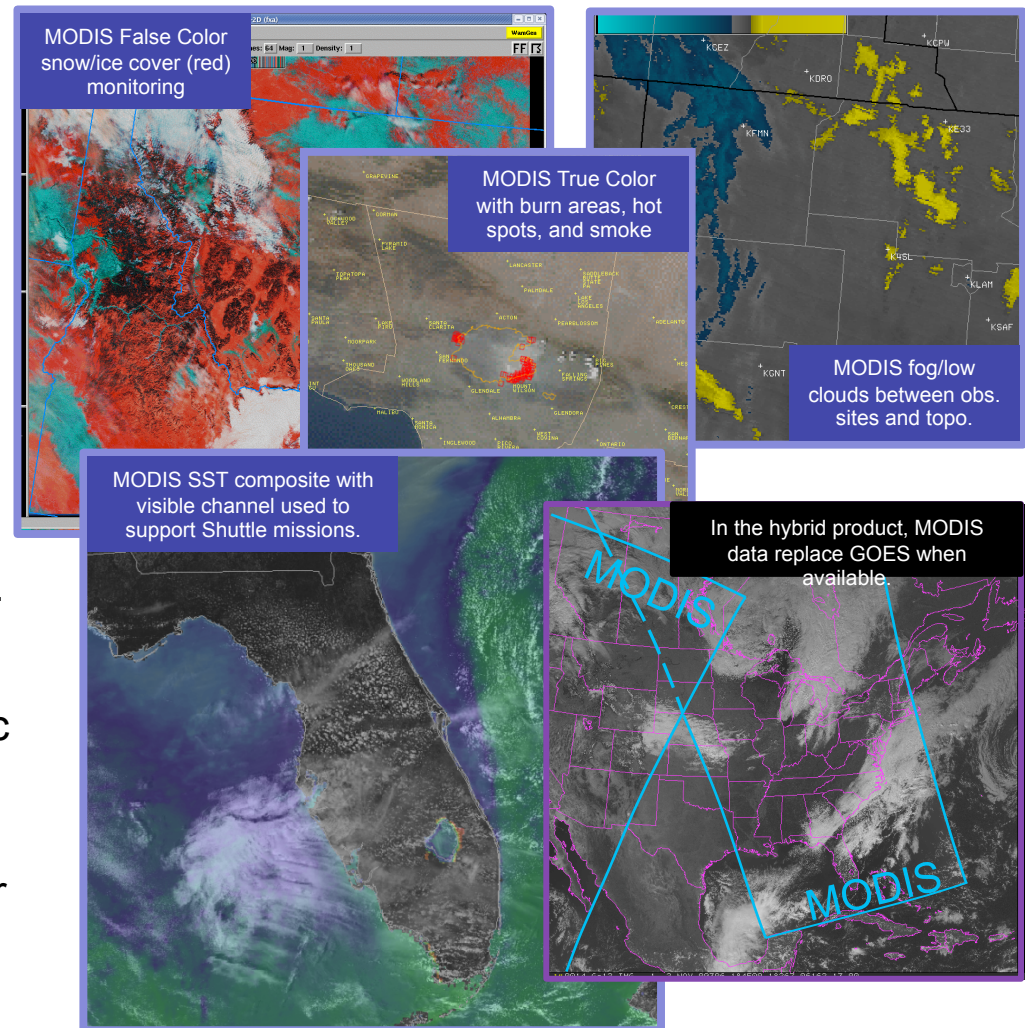
- Infuses NASA EOS data into the short-term forecast process.
- Serves as an introduction to future polar and geostationary products

Unique SPO/RT/NASA Contribution

- High resolution visible imagery, false color products, detection of fog in small terrain features, and hot spot detection.

Future Work

- Additional products to address specific forecast problems
- Blend MODIS and GOES imagery as MODIS becomes available, allowing for a “hybrid” product



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Operational Uses of Lightning Mapping Array

Relevance to NWS Forecasters

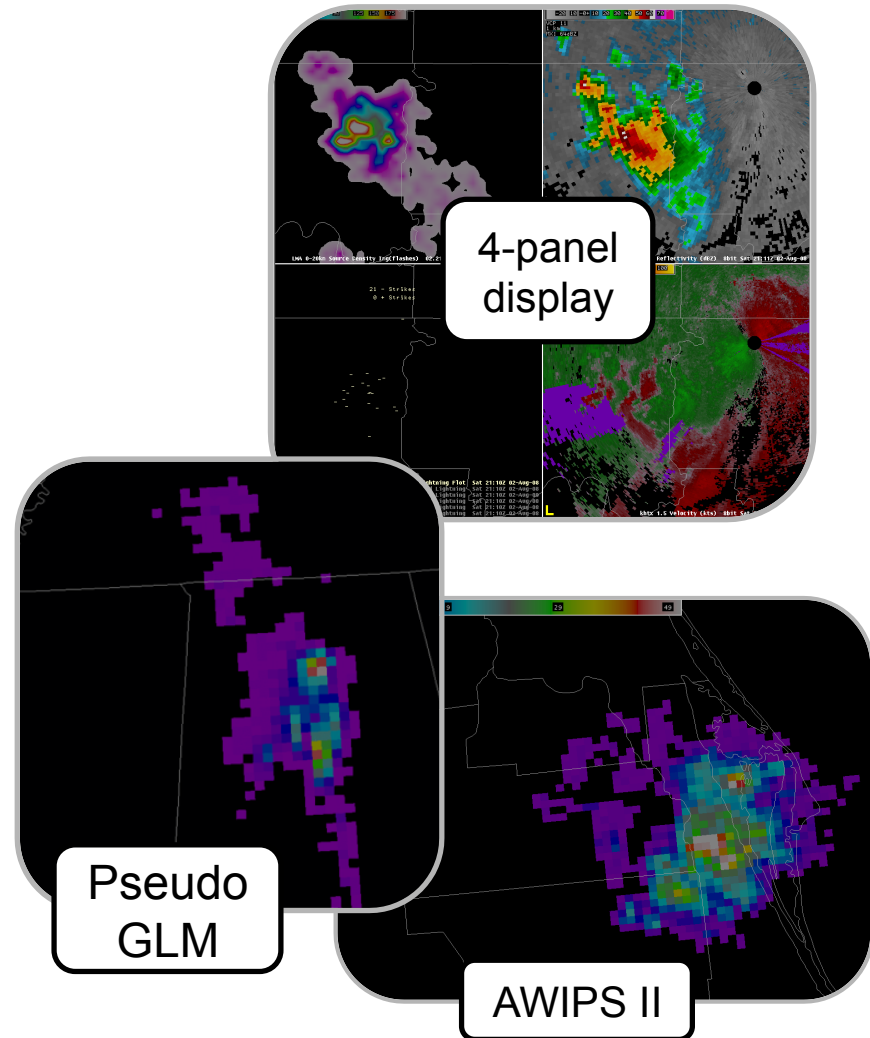
- Some NWS WFOs have access to lightning mapping array data, others will have future access through the GLM on GOES-R.

Unique NASA/SPoRT Contributions

- Working to obtain total lightning data from a variety of CONUS sources (Alabama, DC, Florida, New Mexico, Oklahoma)
- Incorporation of total lightning data within AWIPS/AWIPS 2 for overlay with traditional radar and other analyses
- Translate total lightning trends into severe weather precursors

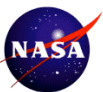
Future Work

- Exploring new tools available within AWIPS or AWIPS 2 that permit tracking of flash rates by cells for use with lightning trend algorithms



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3D Analysis Product Using Hyperspectral Sounder Profiles

Relevance to NWS Forecasters

- Profiles from hyperspectral sounders (e.g. AIRS and IASI) provide rawinsonde-quality observations to fill spatial and temporal data voids
- Temperature and moisture profiles can be used to improve diagnostic analysis, atmospheric rivers, and moisture return forecasts

Unique SPoRT/NASA Contribution

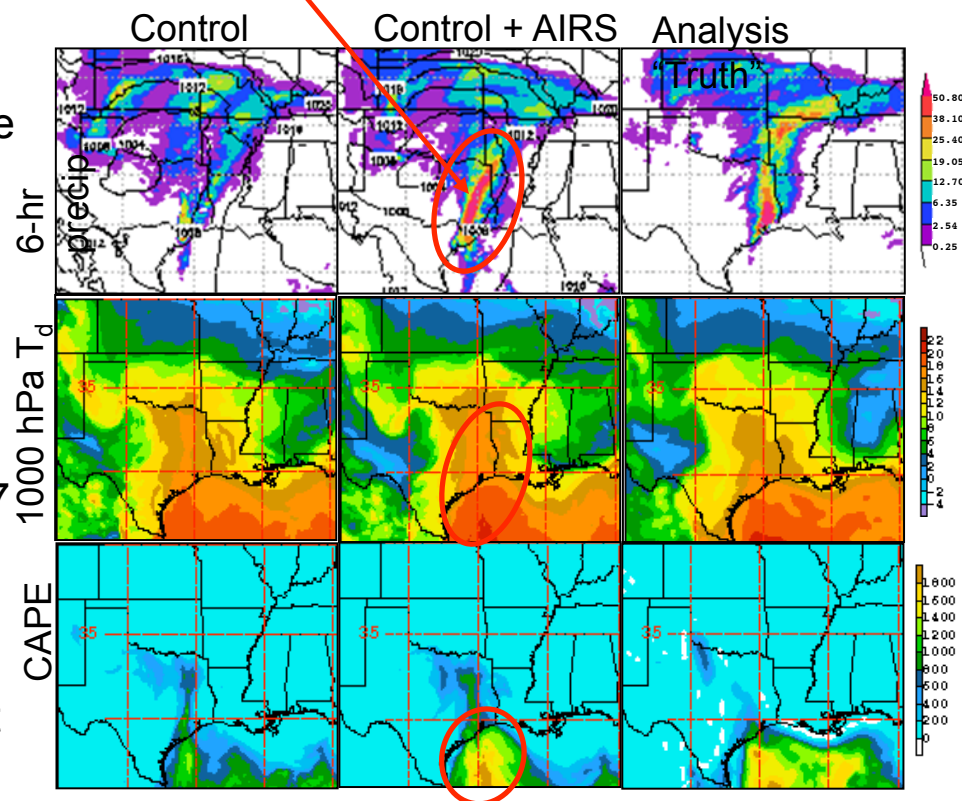
- Configured WRF-Var analysis system to assimilate AIRS thermodynamic profiles
- Rigorous testing of analysis system on 37 case study days from winter 2007

Future Work

- Incorporate IASI profiles into analysis
- Generate and distribute real-time product to WFOs

Improved 6-hr cumulative precipitation from improved CAPE and 1000 hPa dew point

24-h forecast valid 00Z 2/13/07



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Sea and Lake Surface Temperature Composites

Relevance to NWS Forecasters

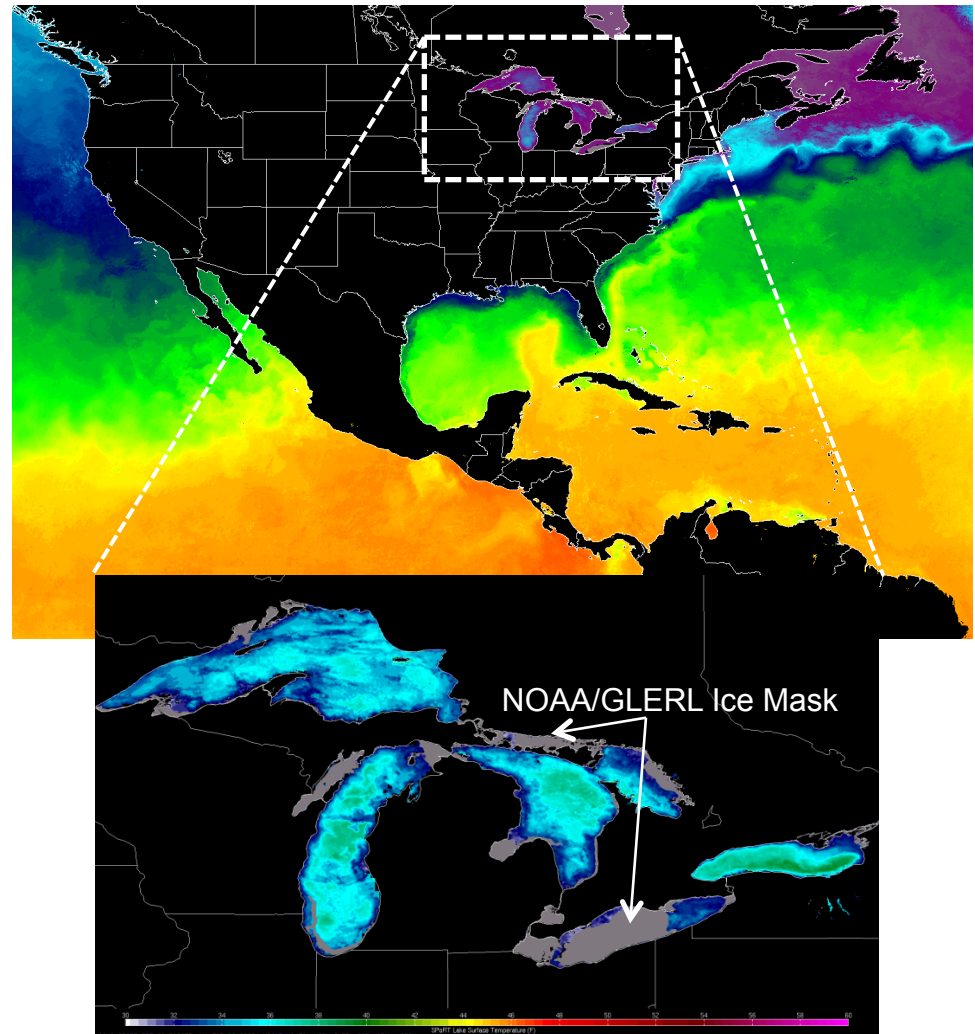
- Observations of sea and lake surface temperatures provide high resolution detail for coastal and marine forecasts

Unique SPoRT/NASA Contributions

- high resolution (1km) MODIS and AMSR-E composites – 4x daily
- Provides coverage throughout North America and the tropics, depicts coastal and Gulf Stream gradients
- Developed a unique application over the Great Lakes that includes lake ice analyses from the NOAA Great Lakes Environmental Research Laboratory (GLERL)

Future Work

- Examine sensitivities of WRF-EMS forecasts to initialization with SPoRT SSTs and Great Lakes temperature composites.



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Applications of the Land Information System (LIS)

Relevance to NWS Forecasters

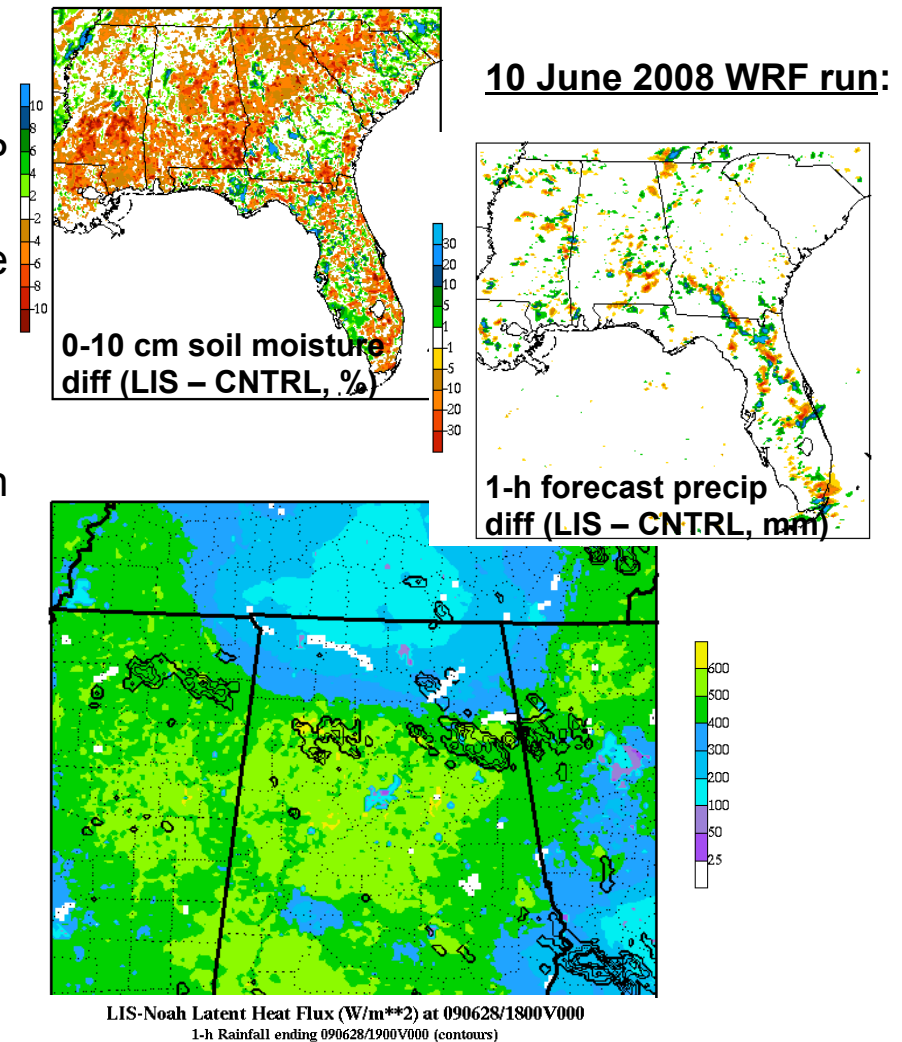
- NASA land surface modeling and assimilation system provides high-resolution soil data for NWP
- Reduces the diurnal 2-m temperature bias in model forecasts and improves QPF for convective events

Unique SPoRT/NASA Contributions

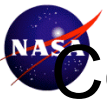
- SPoRT maintains a near real-time run of the NASA LIS, providing output over the southeastern U.S.
- High resolution (3 km) output available for WRF-EMS initialization, currently used by NWS Miami, FL

Future Work

- Incorporate MODIS vegetation data to improve representation of the land surface
- Provide output LIS fields in AWIPS/2 for diagnostic evaluation at partner WFOs



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Contributions to WRF Environmental Modeling System

Relevance to NWS Forecasters

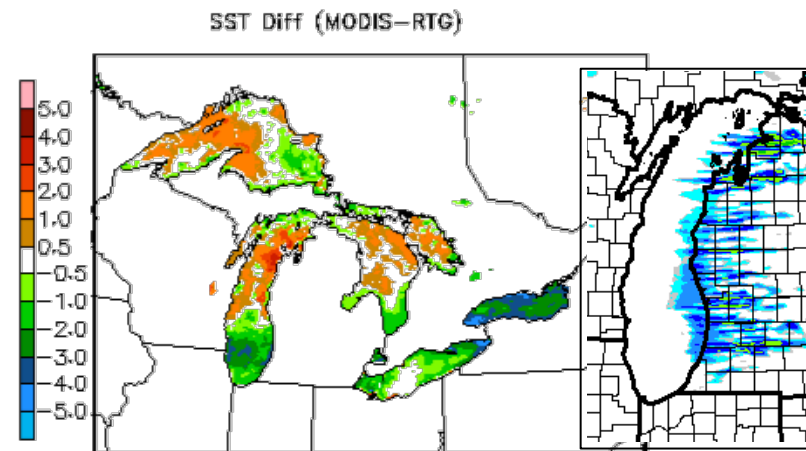
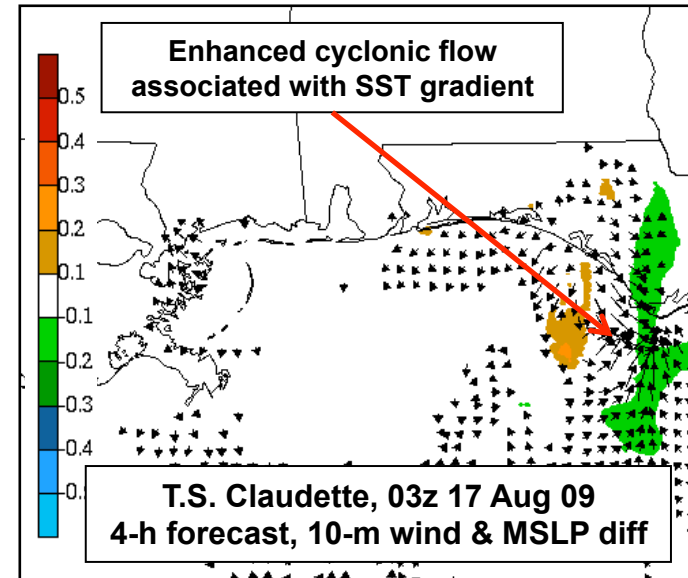
- The WRF-EMS is used within several NWS WFOs to provide local, high resolution forecasts for prediction and training.

Unique SPoRT/NASA Contributions

- The SPoRT SST product is the *current default* within the WRF-EMS, effective V3.1, and real-time composites are distributed four times daily in GRIB format.
- SPoRT provides LIS initialization fields for the WRF-EMS, currently available over the southeastern United States.

Future Work

- Examine impact of Great Lakes temperatures on lake effect weather.
- Broaden the LIS domain to include a broader sample of the United States.



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Use of Experimental Data in Operations

SPoRT Best Practices

- End user interactions
 - understand needs, the operational environment, and forecast constraints – “live in their world” for awhile
 - involve end user in entire process
 - site visits, coordination calls (GoToMeeting), collaborative blogs, collaborative workshops
- Integrate into user DSS (AWIPS, AWIPS2, etc.)
- Produce user training on products
- Document successes
- Communicate results in various forums



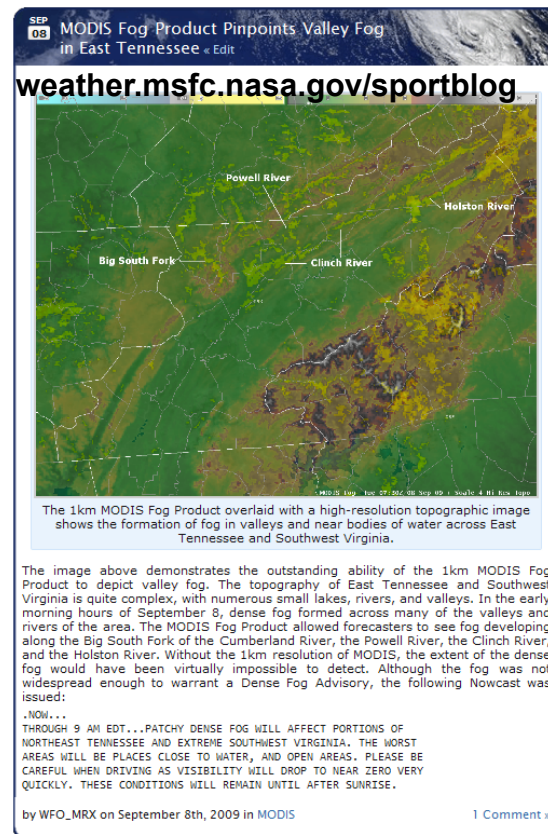
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External Communication and Outreach

Outreach via web, blog, Facebook, publications - more visibility to external community

- Peer-reviewed publications, quarterly and biennial reports
- Revamped SPoRT website , Wide World of SPoRT blog in (over 100 posts since March 2009), >150 Facebook fans (mainly NWS)



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Future Direction

Continue to demonstrate utility of current and future NASA observations

Decision support systems

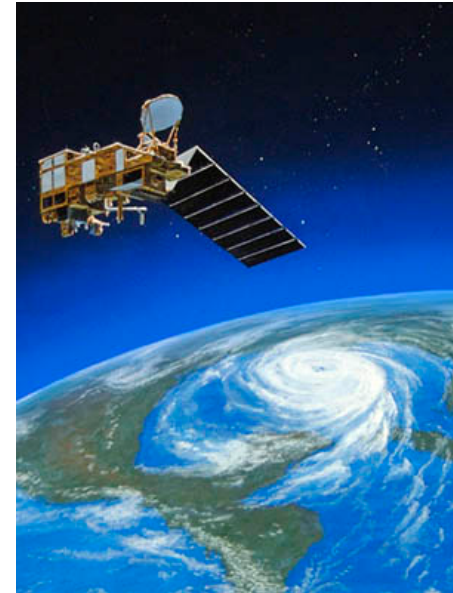
- AWIPS / AWIPS2
- Google Earth

JPSS (NPP / NPOESS)

- VIIRS and CrIMSS data and products to WFOs

Expand partners and end users

- Work more collaboratively with regional centers and other testbeds
- Expand to WFOs in other regions



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